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# Influencing Physician Drug Prescription Habits Towards Cost Containment

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# INFLUENCING PHYSICIAN DRUG PRESCRIPTION HABITS TOWARD COST CONTAINMENT

*Influencer les pratiques prescriptives des médecins pour contenir les coûts*

*Completed Research Paper*

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## Abstract

*In Israel, diffusion of clinical information systems is almost universal in ambulatory medical services. The drug prescription module embedded in a widely-used electronic patient record system has the capacity to intervene and notify physicians about available generic or therapeutic substitute drugs, when their first choice is outside the insurer's preferred drug list. The objective of this paper is to study how such intervention influences drug prescription habits of physicians and helps contain costs. To this end we monitored system use for 40 weeks, recording physicians' willingness to change their choice to a substitute following system notification. Findings show higher physician compliance with generic substitutes than with therapeutic substitutes, based on a cognitive decision process upon notification, and increase in compliance over time, until stabilization. The resulting direct financial savings on expenditure for drugs, estimated to be 4.7% for chronic drugs, entail long-term savings.*

**Keywords:** Clinical information systems, Electronic patient record, Drug prescription system, Physician drug prescription habits, Drug cost containment



## Résumé

*En Israël, la diffusion des systèmes d'information cliniques est presque universelle dans les services médicaux ambulatoires. Le module de prescription de médicament qui est inclus dans le principal système d'enregistrement électronique du patient a la capacité d'inférer et notifier au médecin des substituts quand leur premier choix est hors de la liste des médicaments recommandés par l'assureur. Nous étudions comment une telle intervention influence les habitudes de prescription de médicaments par les médecins et aide à contenir les coûts.*

## תקציר

בישראל, מערכות מידע רפואיות נמצאות בשימוש כמעט אוניברסאלי בשירותי בריאות אמבולטוריים. למודול רישום התרופות של המערכת הנפוצה ביותר לניהול תיקים רפואיים, יש יכולת להתערב ולהמליץ לרופאים על תחליפים בעת רישום תרופה שאינה ברשימת התרופות של קופת החולים. המאמר בוחן, באמצעות מחקר אמפירי, באיזה אופן התערבות זו משפיעה על התנהגות רישום התרופות של רופאים ומסייעת לקצץ בעלויות. התוצאות מעידות על שינוי בהרגלי הרישום והסכון ארוך-טווח של כ 4% בעלות תרופות.

## Introduction

National healthcare budgets comprise a significant portion of the GDP in developed countries, ranging from 15.3% (U.S.) to 6.4% (Mexico) in 2005, with annual growth rates of 5% to 8% between the years 2000 and 2005. This surpasses the growth rate of the economy in these countries (OECD 2007; Schur et al. 2004). Spending on prescription drugs is increasing as well. In the US, for example, the growth rate is 10% to 15% annually, with drug expenditures comprising above 10% of the total healthcare budget in 2005 (KFF 2007). Six major factors, mostly related to increase in prescription volume rather than price, contribute to the increase in spending: (1) Growing prevalence of treatable diseases; (2) Demographic shift toward an older population; (3) Shift of therapies toward more costly drugs; (4) Increase in medication doses used per patient over longer periods of time; (5) Introduction of new therapeutic agents; and (6) Price increases of existing therapies due to inflation (Dubois et al. 2000). Another driver of these cost increases is loosening of restrictions associated with managed care, such as primary care gatekeepers, utilization review, and closed formularies, in response to the managed care “backlash” of consumer reaction that peaked around 2000 (Schur et al. 2004). It is important to note, however, that the volume increase is sometimes correlated with improvement in patient health, as for example with asthma, causing a significant decrease in hospitalization, thus somewhat compensating for the increase in drug costs (Dubois et al. 2000). Nonetheless, spending on drugs merits attention not only because of its magnitude and growth rate (Soumerai et al. 2005), but also because it is believed to be more controllable by, for example, increasing the use of drug substitutes after patent expiration. In order to contain costs, insurers and health maintenance organizations (HMOs) are thus interested in finding ways to monitor physician drug prescription habits and to influence these habits towards a reasonable cost-saving behavior (Shekelle et al. 2006; Subramanian et al. 2007).

Against this background, the objective of this study is to investigate the impact of a notification capacity built into the drug prescription module embedded in an electronic patient record (EPR) system. This EPR system is used fully by the two largest HMOs in Israel (Pliskin 1994; Pliskin et al. 1996), and partially by a third one, covering about 85% of the population. Depending on organizational policy, this system has the capacity to notify physicians engaged in a prescription process about generic or therapeutic substitute drugs, when their first choice is outside the HMO's preferred drug list. By enabling this notification capacity, the HMO studied here aimed to shift physicians' prescription habits toward less costly substitute drugs. Impact was assessed by monitoring patterns of physician compliance with the notifications in general, and in relation to their demographic traits in particular, as well as by assessing the resulting cost savings.

The paper is organized as follows: the next two sections present a brief literature survey, on the background and on the theoretical lens for this paper, followed by the research method. The results are then presented, leading to a discussion and conclusions.

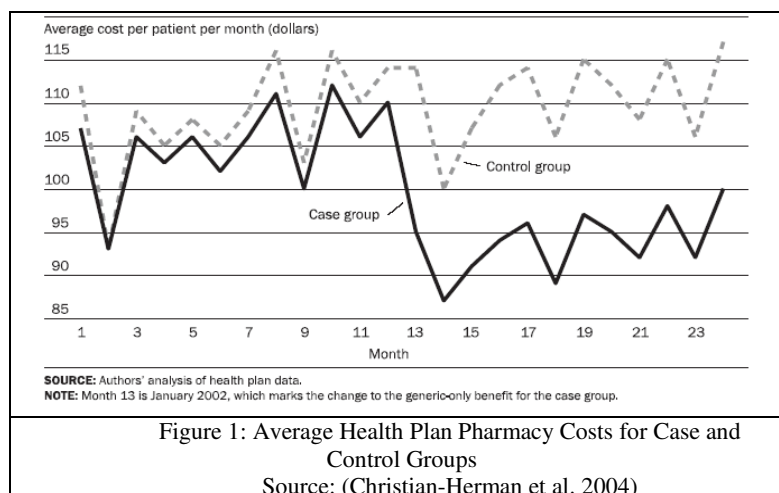
## Background

Drug prescription is a primary component of medical care. The large range of effective drugs contributes to physicians' ability to change the course of disease. Yet, drug treatment can cause new medical problems if incompatible with the patient's physiological conditions or age, due to interaction with other drugs or if inaccurately dosed or consumed (Wolfstadt et al. 2008). In general, drug prescription suffers from quality problems, cost problems, and ineffective response to administrative measures (Shamliyan et al. 2008). Moreover, when the full impact of cost containment measures related to drugs is closely examined, a rather disturbing picture appears depicting adverse impact on the national health: additional specialist referrals and hospitalizations; denial of needed therapies, particularly for the elderly and other vulnerable groups; deterioration in the overall quality of medical treatment; increased bureaucratization; and higher costs system wide (Looney 1995; Schur et al. 2004). The results of Looney's work have been substantiated by other studies (Gibson et al. 2005). For example, when a cap was instituted in New Hampshire on medications available to Medicaid patients, there was a substantial increase in admissions to nursing homes and a lesser but still measurable increase in hospitalization, and these figures reversed themselves when the cap was lifted, with conservative calculations revealing that the extra costs created by the cap significantly exceeded any savings (Schroeder et al. 1991; Soumerai et al. 1991).

### Drug Cost-cutting Measures

The availability of a wide range of drug substitutes, particularly less expensive generic drugs, drives HMOs to control prescription drug budgets by several measures, of which the most common are: (1) administering drug formulary (Huskamp et al. 2005); (2) shifting to generic-drug-only coverage (Fung et al. 2008); and (3) instituting co-payments (Gibson et al. 2005). Under the first measure, physicians choose from a list of drugs recommended or allowed for prescription by the insurer, aimed at improving quality, safety, effectiveness, and cost-benefit ratios. In the Veteran Health Administration (VHA) in the US, an examination of drug expenditure revealed that administering drug formulary has increased the market share of the selected drugs and the purchasing power of the insurers while significantly reducing drug costs for these organizations (Huskamp et al. 2003b).

The second measure of shifting to generic-drug only coverage (Christian-Herman et al. 2004; Fung et al. 2008), demonstrated a simple and effective measure since drug cost per patient was significantly reduced by the shift to generic-drug-only coverage at Month 13 (Figure 1). Yet negative consequences entailed such as increased drug cost per patient, possibly due to change in drug consumption habits, as well as an apparent increase in hospitalization.



The third measure, co-payment, has proven to contain the costs of prescription drugs. Various co-payment arrangements exist, including fixed-sum, differential co-payment for generic and patent drugs, special co-payment programs for generic drugs only, etc. (Currie et al. 2007; Reed et al. 2008). All co-payment forms demonstrate reduction in the insurer's drug costs, while out-of-pocket expenses for the insured patient increase. Increases of co-

payments from \$5 to \$10 for generic drugs, and from \$10 to \$20 for patent drugs, resulted in a 33% decrease in the insurer's spending on prescription drugs. Adding a co-payment category of \$30 for non-preferred drugs resulted in a further cost decrease of 4%, and a forced change from patent drugs added another 8% in cost savings (Currie et al. 2007). It is important to note that in spite of such positive economic and social effects (i.e. more efficient distribution of resources), these interventions also entail serious negative consequences (Gibson et al. 2005). Several studies that investigated the effect of changes in co-payment arrangements, for example by increasing the patient out-of-pocket spending on drug consumption, revealed that the more aggressive the change, the more it affected drug disciplined habits, to the degree of total avoidance of taking the prescribed drugs, especially by the under-insured and elderly populations, but also in other populations with partial coverage (Goldman et al. 2004; Huskamp et al. 2003a; Reed et al. 2008; Steinman et al. 2001). Administering or increasing co-payment resulted in a decrease of 9% in consumption of chronic drugs among the elderly and a decrease of 14.5% among patients in need, as well as a significant increase in health events such as hospital visits (Goldman et al. 2007; Reed et al. 2008; Tamblyn et al. 2001).

### ***Intervention in Physicians' Drug Prescription Habits***

Factors other than professional medical decisions, such as patient expectations to receive a drug prescription, often affect physician drug prescription habits. Drug prescription prospects increased three-fold when patients assumed there was a need for a prescription, and ten-fold when care providers assumed that patients are expecting a prescription (Cockburn et al. 1997). In general, there is a significant variance in physicians' prescription habits in terms of quantity and cost. For example, a British study found that the cost of prescribed drugs in the general-practitioner top category was twice that of the bottom category (Watkins et al. 2003). Other factors found to affect drug quantity and variety are: patient average age, number of registered patients per physician, physician work load (Bjerrum et al. 2000), physician gender and education, as well as team-work (Gill et al. 1997; Segal et al. 1999; Watkins et al. 2003; Wun et al. 2002). Specialists and private practitioners tend to prescribe slightly newer and more expensive drugs, usually related to their area of expertise (Karahannas et al. 1999), while general practitioners in HMOs prescribe somewhat cheaper drugs (Håkansson et al. 2001). Visits of the pharmaceutical sales agents, as well as recommendations by experts or hospitals, have also been found as common causes for changing to new drugs (Prosser et al. 2003a). In fact, one study found that, although physicians claimed that their drug prescription habits stem from professional sources such as journals, 42% of the examined prescriptions for new drugs resulted from information provided during visits of sales representatives (Fugh-Berman et al. 2007; McGettigan et al. 2001). Physicians who tend to prescribe new drugs could be characterized as relying more heavily on external sources rather than on personal knowledge (Prosser et al. 2003b).

Four measures are commonly used to affect drug prescription habits: administrative, educational, feedback, and incentives (Segal et al. 1999; Soumerai et al. 2005). 1) Administrative measures include the drug formulary, shift to generic drugs, and co-payment measures described earlier. 2) Educational meetings, are costly, yield mixed results, and require long-term presence of educators (Midlov et al. 2006). 3) Feedback measures include providing care providers with a periodical summation of the total cost of their prescribed drugs. While proven effective in several cases (de Lusignan et al. 2002; Schwartzberg et al. 2006), the feedback given in retrospect is not specific or detailed and its effectiveness is limited and vanishes as soon as the feedback is discontinued (Ferrer et al. 2002). Likewise, real-time cost information presented during the prescription process upon the physician's use of an order entry system, practiced in a controlled experiment, did not result in significant cost reduction of prescribed drugs in general, although some cost reduction has been achieved for several drug groups (Ornstein et al. 1999). 4) Incentive measures, such as risk sharing, which are problematic because of a potential conflict of interests between economic pressures and patients well being, have been practiced but research reporting their impact is still scarce (Armour et al. 2001). It is generally accepted that positive incentives, such as peer reviews, measurements based on treatment guidelines, or patient satisfaction, are more desirable and effective than negative incentives (Grumbach et al. 1998).

The results of studies examining efforts to affect physician drug prescription habits are mixed. While one study showed that extensive investment in education had no significant effect (Bradley et al. 2000), another found that face-to-face educational meetings, as well as written instructions, resulted in improvement of drug prescription habits (Schwartzberg et al. 2006). In another study, researchers failed to demonstrate response to drug prescription recommendations for hypertension even when a reminder has been attached to the patient file in advance (Sanders et al. 2002). A comparative study of British and Italian physicians, among others, showed that physicians in both countries are suspicious and even negative about organizational efforts to contain drug costs and would find ways to

help patients in need even at the expense of the insurer (Estellat et al. 2007; Hassell et al. 2003; Thompson et al. 2005). In contrast, other studies reported a significant improvement in drug prescription quality, attributed to physician use of a computerized order entry system that included drug use guidelines, alternative offerings, and suggestions of appropriate doses and frequencies (Raebel et al. 2007; Smith et al. 2006; Teich et al. 2000).

### ***The Effect of Cost on Physicians' Prescription Habits***

In a survey among physicians, 88% of respondents claimed that cost is a primary factor affecting their drug prescription decision, with 71% even willing to sacrifice treatment effectiveness for the sake of higher patient adherence to the treatment (Reichert et al. 2000; Walzak et al. 1994). This, however, was found to hold more strongly for partially-covered or under-covered patients, or when care providers assume that the out-of-pocket cost is beyond the financial capabilities of the patient (Kasje et al. 2002). Since most respondents claimed they accounted for drug costs upon prescribing, it is interesting to note that when examining the accuracy of physicians' estimation of drug costs, 80% of respondents were unaware of the costs of their prescribed drugs, only 33% had access to such information and only 13% received any training about costs of drugs (Kasje et al. 2002). In another study (Ernst et al. 2000), only 22% knew the costs of drugs while 68% under-estimated drug costs in general (90% for patent drugs), 92% over-estimated the price of generic drugs, 65% thought they lacked costs information, and all would have liked to have access to actual drug costs (Allan et al. 2007). In another study, physicians consistently overestimated the cost of inexpensive drugs and underestimated the cost of expensive ones (Allan et al. 2007). An important finding is that physicians tend to prescribe generic drugs when they know the patient bears the costs, but tend to ignore this alternative and prescribe more expensive drugs when the patient is fully covered (Ernst et al. 2000). Moreover, several popular patent drugs have been considered generic by physicians, causing them to refrain from prescribing generic substitutes (Fortune et al. 2003). In summary, in spite of drug costs being a critical factor in determining healthcare costs, research shows that physicians are uninformed about drug costs. One of the tools that can potentially elevate awareness and alleviate cost pressures in drug prescription is a computerized drug prescription system (DPS), preferably embedded in an electronic patient record (EPR) system.

### ***EPR and DPS Diffusion***

Diffusion of computerized clinical information systems is quite young and non-uniform worldwide (Anonymous 2002; Bower 2005; Hillestad et al. 2005; Kaushal et al. 2005; Middleton 2005; Shortliffe 2005). While some studies report an adoption rate of 15-20 percent for EPR systems in the US (Hillestad et al. 2005), a 2007-8 survey of physicians in the US found that only four percent of physicians reported having an extensive, fully functional EPR system, and 13% reported having a basic EPR system. In multivariate analyses, primary care physicians and those practicing in large groups, in hospitals or medical centers, and in the western region of the US, were more likely to use EPR systems (DesRoches et al. 2008; Lee et al. 2005). In fact, the literature about clinical information systems is fragmented and their general characteristics and work environments are not well defined (Oliva et al. 2008). For example, only three out of eighteen surveyed systems operated in a primary care environment, while most were used within academic hospitals (Kuperman et al. 2003). Generally, practitioners report that EPR systems positively affect preventive medicine (Holdsworth et al. 2007) yet have mixed effects on adhering to clinical guidelines or on treatment effectiveness (Glassman et al. 2006; Koppel et al. 2005). Nonetheless, in spite of indecisive EPR contribution to the quality of medical care, most users express satisfaction with EPR systems (Delpierre et al. 2004; Doolan et al. 2003; Grossman 2004).

In contrast, in spite of difficulties in initial acceptance, DPS systems have been perceived by physicians as effective tools and contributing to improved quality of their work, via reduction of common drug prescription errors as over-dosing, under-dosing, or wrong prescription (Colpaert et al. 2006; Tamblyn et al. 2006; Zalman et al. 2000). Indeed, compared to manual prescriptions, several experiments reported DPS effectiveness in reducing such errors (Davey 2006; Maurer et al. 2003; Rochon et al. 2006). Studies of DPS use revealed that drug prescription time increased at the initial stages of DPS use but then decreased, resulting in physicians perceiving the system as effective and efficient (Blumenthal et al. 2007; Overhage et al. 2001). Nonetheless, variance in user satisfaction and intention to use was found among users of DPSs that supposedly had similar functionality yet different user interface (Murff et al. 2001; Shah et al. 2006).

An emerging DPS feature is the capacity to provide users with advice about a substitute drug during the prescription process (Kuperman et al. 2007). Several attempts to document physician compliance with such advice, as well as to

assess its impact on improving the quality of clinical care and on containing insurer costs, resulted in mixed findings (Fung et al. 2008; Martens et al. 2008). While one study showed that compliance with prescription of a recommended substitute drug has increased from 15.6% to 81% as a result of DPS use (Teich et al. 2000), findings of other studies were less decisive (Shea et al. 1996; van der Sijs et al. 2006). Even when a DPS displayed drug cost information in real time, there was no significant change in the overall organizational drug costs after six months of DPS use, indicating that physician drug prescription habits were deeply engraved and hard to change, and that unavailability of drug cost information is apparently not the primary cause for high drug expenditures (Ornstein et al. 1999; Shah et al. 2006; Vedsted et al. 1997).

### **The State of EPR and DPS Diffusion in Israel**

Clinical information systems are widely implemented in Israel since 1990. For almost twenty years, the EPR system studied here has been used by the majority of primary-care physicians in Israel, as well as in many secondary care clinics and in hospitals (Pliskin 1994; Pliskin et al. 1996). Since the two largest HMOs in Israel, which provide medical care to about 80% of the population, have adopted this application as their mandatory organizational EPR system, and a third HMO has partially adopted it (covering additional 5% of the population), almost all primary care records in Israel and the vast majority of secondary care records are fully computerized via this EPR system. Installed on a desktop personal computer, this system is linked to a patient-records database generally hosted on local or central servers (depending on the organizational information-technology architecture of the implementing HMO). The EPR system facilitates electronic real-time documentation of all physician-patient encounters during a visit, and selective context-based data retrieval during treatment monitoring. In addition to order entry for drugs (via a built-in DPS module), the system supports such processes as laboratory referrals, expert consultation and imaging, and a bi-directional interface with administrative computerized systems, used to validate patient coverage and transmit various administrative data to the HMOs, for example for cost calculation purposes.

The built-in DPS module displays clinical details relevant to the prescription process, including current and previous drugs prescribed to the patient, patient clinical information, and known allergies or sensitivities. Also presented is a list of drugs, categorized by pharmacological groups, for the physician to select a drug from. The list (see Figure 2) reflects the HMO's drug formulary, where drugs are ordered from the most to least preferred according to the HMO policy for drug coverage. Physicians may then select any drug from the list as a first choice. The list contains ample information about each drug, some visible and some available upon clicking (e.g., administrative and pharmacological information). Visible information includes the drug patent, generic and commercial names, color, form, dosage, and drug price category (from \$ to \$\$\$\$). Additional indications are annotated by color. For example, unapproved drugs which require full payment by the patient are colored in black and drugs with a generic substitute in pink. Upon selecting a drug from the list, the physician is presented with drug attributes, as name, dosage, and drug form, and can either fill in the quantity and the administration policy or select from a pre-prepared menu. Most importantly, the selected drug is then checked for allergies or contra-indications with other drugs currently used by the patient, and relevant alerts appear on the screen. If approved, the number of original packages is calculated for the pharmacy, and the drug is recorded in the EPR system, and the record is transmitted to a central database for monitoring and administrative use.

Depending on its policy, the HMO can choose to harness a notification capacity embedded in the DPS module of the EPR system. This is done by setting up the system to notify the physician about available HMO-preferred generic substitutes (where the substitute is identical in chemical formulation to the patent drug) or therapeutic substitutes (where the substitute is not identical), upon prescribing a non-preferred drug for the first time. Thus, when a physician prescribes a drug outside the HMO's preferred drug list, the notification comes into play and notifies the physician in real time: "Have you considered prescribing XXXX?" (See Appendix 1) The physician can then either choose a preferred substitute from the list instead of his/her first choice, or ignore it, in which case s/he is asked to fill an online form, explaining his choice (See Appendix 2). This feature, however, is only activated for drugs prescribed to a patient for the first time, to which there are HMO-preferred substitutes.

Following a brief presentation of the theoretical lens and the research method in the next two sections, we present results about the extent to which this notification capacity of the system has influenced the drug prescription habits of physicians whose first choice is not an HMO-preferred substitute, and thus helped contain drug costs.



Commercial Name	Prnt.	Strength	%	Price
ABOSYNAGIS	VIA	100MG	100	
ABOSYNAGIS	VIA	50MG	100	
ABITREN	SUP	50MG X 10	100	0
ABITREN	TAB	100MG X 20	100	0
ABITREN	TAB	100MG X 10	100	0
ABITREN	TAB	25MG X 20	100	0
ABITREN	AMP	75MG X 5	100	00000
ABROL NEW	TAB	500MG X 20	100	0
ABROLET FORTE NEW	SUP	250MG X 12	100	0
ABROLET NEW	SUP	150MG X 12	100	0
ACAMOL	TAB	500MG X 20	100	0
CAP	500MG X 21	100	0	
ACAMOL CAPLETS	CAP	500MG X 50	100	00000
ACAMOL TSIN CLAS.	TAB	21+14	100	

Test Name	Result	Unit
Creatinine(b)	1.8	mg/dL
Urea(b)	44.0	mg/dL
AST(GOT)	11.0	U/L
ALT(GPT)	8.0	U/L

Drug Name	Dosage	Days	Total	OP	Re	P	C	N
OCSAAR	50MG X 30	3314						
CLONEX	0.5MG X 30	502						
FOLIC ACID	5MG X 30	48766						
INSULIN HUMAL MIX	3ML X 5	22655						

Name	Quan.	How	Times	Dosage	Days	Tot	OP	Re	P	C	N	Remark	DrugID

Figure 2: The Drug Prescription Module

## Theoretical Lens

IT adoption by individuals, as well as compliance with recommendation systems, can provide the theoretical lens underlying this study. The most extensively researched adoption theory in the individual level of analysis is TAM, the Technology Acceptance Model (Davis 1989), where perceived usefulness and perceived ease of use have been found as the two most important determinants of intention to use a computerized system, with perceived usefulness found to affect intentions twice as strongly as perceived ease of use in numerous empirical studies (Gefen et al. 2003; Monsuwe et al. 2004). This model, later extended to include additional factors such as trust (Gefen et al. 2003), was further supported in various environments and for several types of applications (Pavlou et al. 2006), and within various organizational settings (Venkatesh et al. 2003).

The literature discussing adoption of EPR systems is consistent with TAM's assertions that individuals are more likely to adopt new applications the more they perceive the system to enhance their job performance while being relatively easy to use. Indeed, according to the EPR adoption literature, a questionable business case, perceived impediment to productivity, and lack of computer-use skills are important factors hindering EPR adoption, especially by physicians in small or solo practices (Blackford 2005; Burt et al. 2005; DesRoches et al. 2008; Lee et al. 2005; Lu et al. 2005). These barriers are compatible with perceived usefulness and perceived ease of use.

Theories and models underlying recommendation systems and compliance have shown that the level of compliance is positively correlated with the fit between the recommendation adequacy and individual user preferences (McSherry 2005). A scarcely researched type of recommendation is the feature of notification, alerting users to a certain situation (e.g. license agreement or file deletion) and consent. It has been shown that users tend to hastily ignore most notifications, often consent absent-mindedly, sometimes to eventually regret this action (Good et al. 2007). Research within the discipline of human-computer interaction looks into various forms of notifications aimed at attracting more user attention and less automatic dismissal. Notwithstanding the importance of this topic, it is beyond the scope of the present work, although the notification interface of the investigated system has been presented in the previous section, and is further discussed later.

While most research on recommendation and notification systems is largely relevant to the profile of the individual consumer, the drug notification capacity described above is quite different, mainly because its recommendations are based on organizational preferences rather than on preferences of the individual. Hence, in the absence of an adequate theoretical lens in the recommendation systems domain, different models and theories should be developed

for the healthcare context. Such development requires an exploratory initial study for which this study paves the way.

## Research Method

An empirical field study was conducted at the second largest HMO in Israel, where a 100% of primary care physicians use the Clicks® EPR system on a regular basis, as do most other primary-care physicians in Israel. This HMO has implemented the substitute notification capacity of the EPR system in the early 1990s, enabled by the built-in DPS module, for 1443 of the 2600 registered drugs. The first author, the co-founder of Roshtov Software Inc. ([www.roshtov.com](http://www.roshtov.com)) and the developer of the Clicks® EPR system and its DPS module, incorporated a transparent agent into the system for data collection purposes of this field study, with the consent and blessing of top management of the HMO. Using data monitoring and storing tools, this agent documented in real-time each and every prescription encounter of every physician. In addition to documenting routine prescription encounter data, the following details were documented if the physician's first-choice drug was outside the HMO's preferred drug list and the notification capacity was therefore activated: the first choice of the physician, the ranking of this choice in the HMO's preferred-drugs list, the change in initial selection (if occurred), and the duration of the process from start to finish. Demographic traits of the physician and the total number of visits and prescriptions were also collected.

Table 1. Research Terminology	
Generic substitutes	Drugs that are chemically identical to a patent drug, manufactured after patent expiration by various manufacturers and sold under various commercial names
Therapeutic substitutes	Drugs that are aimed at achieving similar therapeutic objectives, yet differ in their chemical formula or method of administration
Notification capacity	Capacity of the DPS module embedded in the EPR system which notifies a physician whose first-choice drug is outside the HMO's preferred drug list about available preferred substitutes, a notification with which s/he may comply or not.
Self compliance	Physician behavior that triggers no notification from the DPS since s/he selects the drug at the top of the preferred-drugs list as a first choice
Self compliance rate	The number of self-compliant prescriptions divided by the total number of prescriptions with substitutes (available to the physician in the same preference group)
Assisted compliance	Physician behavior as a result of a notification from the DPS that leads to changing the drug choice to a drug at the top of the preferred-drugs list
Assisted compliance rate	The number of assisted-compliant prescriptions divided by the total number of prescriptions without self compliance (total number of prescriptions with substitutes minus prescriptions with self-compliance)
Total compliance	The sum of self-compliant and assisted-compliant prescriptions
Non-compliance rate	The number of prescriptions for drugs that are not at the top of the preferred-drugs list divided by the total number of prescriptions with substitutes (even if the initial choice has been changed but not to the preferred drug)
Learning curve	A temporal curve illustrating change in self compliance

The collected data allowed identifying three types of physician's drug prescription habits: self compliance, assisted compliance, and non-compliance. Self compliance occurs when a physician's first choice is to prescribe a drug high on the HMO's formulary list of preferred drugs as presented by the system upon prescribing, thus spontaneously self complying with HMO's policy. Assisted compliance occurs when a physician's first choice is to prescribe a non-preferred drug but s/he is willing to change that prescription to a preferred substitute upon being notified by the system, thus complying with HMO's policy while assisted by the system. Non-compliance occurs when a physician is unwilling to accept the system's notification for a drug substitute and stays with the original first choice even after being notified, thus not complying with HMO's policy. All three types were recorded and are reported in the results.

Yet, the focus of this study is on the assisted compliance and non-compliance groups who were prompted by the notification capacity.

Data collection, lasting 40 consecutive weeks from June 1<sup>st</sup> 2005 to February 28<sup>th</sup> 2006, targeted all 176 primary care clinics of the HMO, without any sampling. Data were stored in an MS-Access 2003 database and analyzed using JMP Statistical Discovery by SAS. Table 1 summarizes the terminology used in the analysis reported in the next section.

## Results

As shown in Table 2, 647 physicians were studied in 176 participating clinics, of which 350 were HMO-employed and 297 were independent. Most (414) were general practitioners and the rest (233) were specialists in various disciplines. The number of specialists was significantly larger (52.8% vs. 21.7%,  $p < 0.0001$ ) among the independent, as was the number of males (59.2% vs. 38%,  $p < 0.0001$ ). The average age in both the HMO-employed and independent groups was statistically similar (~48), yet the average tenure on the job was longer for the latter group (7.64 vs. 9.03,  $p < 0.0022$ ). Physicians worked 132.52 days on average (of 272 work days) during the study period, with the independent ones working significantly more days on average than the HMO-employed (140.98 vs. 125.34,  $p < 0.0001$ ). In an average work day, physicians treated 25.13 patients, with independent ones treating more patients than HMO-employed (28.9 vs. 21.9,  $p < 0.0001$ ). Overall, 3,414,521 patient visits were recorded, of which in almost 60% at least one drug was prescribed, resulting in a total of 5,271,474 prescriptions. There was no significant difference in terms of the numbers of visits yielding a prescription between the independent and HMO-employed physician groups. Of the 5,271,474 prescriptions, 1,229,615 were for first-time newly-prescribed drugs that have recommended substitutes. These prescriptions, comprising the data for this study, were for 1,443 drugs in 378 pharmaceutical groups, 291 (77%) had an average of 2.52 (between 2 to 11) generic drug substitutes. The rest had an average of 6.93 (between 2 and 38) therapeutic drug substitutes.

Table 2: Descriptive Statistics				
	Independent	HMO-employed	Total	Significance
Number of physicians	297	350	647	
Number of general practitioners / Specialists	140 / 157	274 / 76	414 / 233	$P < 0.0001$
Average physician age (S.D.)	48.8 (7.7)	48.06 (9.17)	48.4 (8.53)	Insignificant
Average (S.D.) tenure on the job	9.03 (5.42)	7.64 (6.00)	8.27 (5.77)	$P < 0.0022$
Males	59.26%	38.00%	47.76%	$P < 0.0001$
Average (S.D.) number of work days per physician during the study period	140.98 (55.53)	125.34 (48.72)	135.52 (52.5)	$P < 0.0001$
Number of visits	1,988,419	1,425,102	3,414,521	
Average (S.D.) number of patient visits per day	28.9 (17.18)	21.92 (10.96)	25.13 (14.57)	$P < 0.0001$
Number of visits yielding prescriptions	59.15%	60.97%	59.94%	Insignificant
Number of drug prescriptions	2,772,371	2,499,103	5,271,474	
Number of prescriptions for drugs with substitutes	672,018	557,597	1,229,615	

### *Patterns of Physician Compliance with Notifications*

Table 3 displays average self-compliance, assisted-compliance, and non-compliance rates. The results, differentiating between generic and therapeutic substitutes, show higher effectiveness of the notification capacity of the system in terms of compliance with generic substitutes, with 62% willing to change their first choice. Yet, the results show that physicians were willing to change their first choice to therapeutic substitutes in 11% of cases.

Table 3: Compliance Rate for Generic and Therapeutic Substitutes

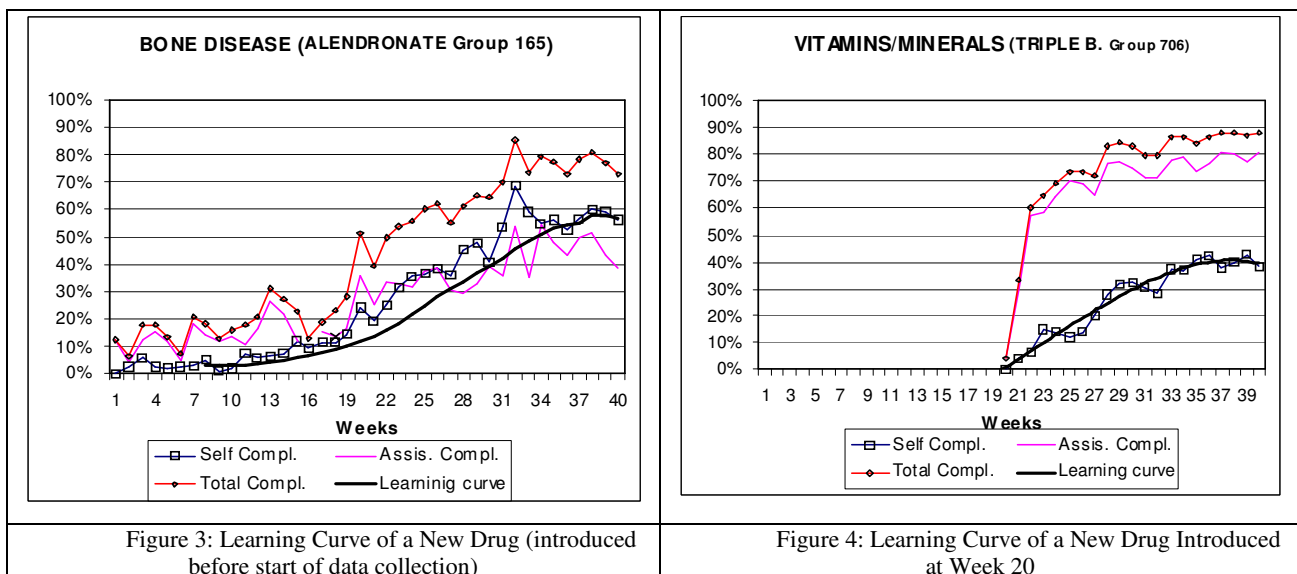
	Generic drug substitutes	Therapeutic substitutes	Significance
Self compliance rate	.7138	.2774	P<0.0001
Assisted compliance rate	.6212	.1089	P<0.0001
Non-compliance rate	.1084	.6471	P<0.0001

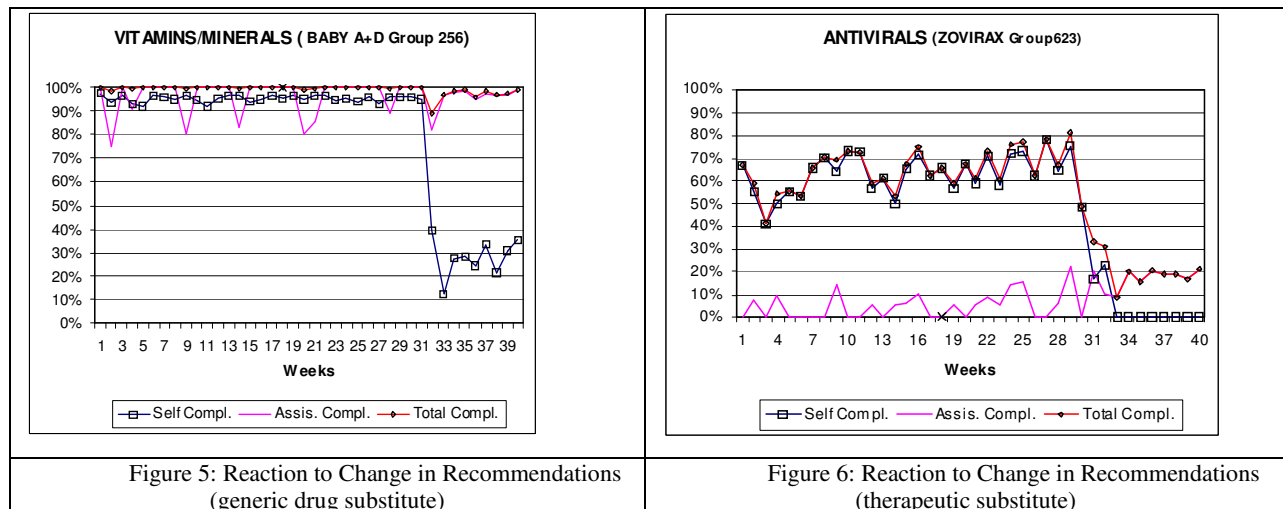
Diverse results are revealed in the various drug categories. In the case of an anti-inflammatory drug, for example, of 5872 documented prescriptions, 93% were assisted-compliant prescriptions, reaching 98% total compliance rate given the 65% self compliance, in close to zero average response time. In the case of an anti-diabetic drug, for example, the results show 81% assisted compliance, reaching total compliance of 94% given the 65% self compliance, within 1.68 seconds average response time.

Examination of patterns of compliance within drug categories and between generic drugs substitutes and therapeutic substitutes shows assisted compliance to be quite high (around 90%) for generic substitutes and rather low for therapeutic substitutes. If we add to this the fact that self compliance tends to be stable among generic groups, high for some groups but low for others, with insignificant change during the study duration where no change in policy occurred, the results thus show that most physicians are willing to selectively comply with HMO policy. While on average the response time to notifications about a generic substitute was nearly 0, refusal to comply with a therapeutic substitute took about 10 seconds, suggesting that physicians carefully consider notifications about substitutes rather than absent-mindedly or lightly.

### Learning Curves

Introduction of new drugs, one before data collection commenced, and one at Week 20 of data collection, or changes in recommended substitutes, allowed elicitation of learning curves over the 40 weeks of data collection. For introduction of new drugs, the learning period in Figures 3 and 4 is characterized by a continuous increase in assisted compliance, as well as in self compliance, towards stabilization. In Figure 4, the learning curve is steeper and accompanied by a sharp climb in assisted compliance.

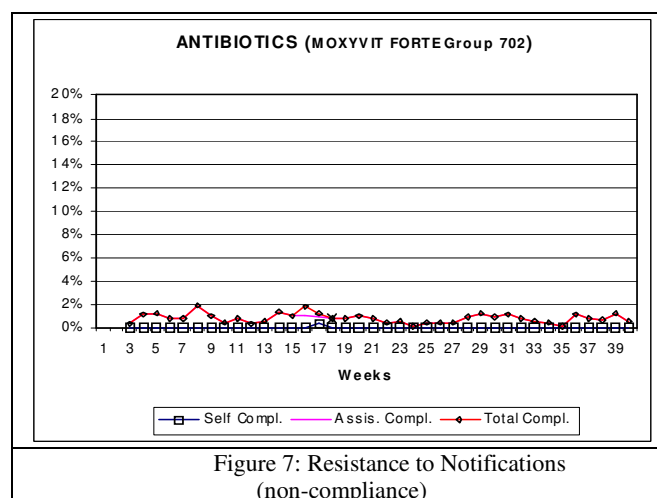




Also noteworthy is that a change in the drug policy of the HMO in the generic drug substitutes group resulted in a steep decrease in self compliance, compensated for by a high and stable assisted compliance occurring within a week after policy change, while self compliance remained low (Figure 5). This, however, is not the case in the therapeutic substitutes group, where the assisted compliance rate was low (Figure 6). Although self compliance behaves similarly for the two groups, the assisted compliance rate for the therapeutic substitute was not affected and remained low. Learning curves for drugs in drug groups where no such change has occurred, show that self compliance increased slightly with time, whereas assisted compliance tended to remain rather stable, implying that the contribution of the system's notification capacity to compliance does not diminish over time, and there is merit in notifications for existing as well as for new drugs.

### Resistance to Notifications

In certain pharmaceutical groups, however, all efforts to impact physicians' drug prescription habits failed, as depicted for example in Figure 7 for the antibiotics group. In one case, the HMO's effort to shift physicians' prescription habits via notifications from one drug to another drug, not identical in its chemical formulation, resulted in 5% self compliance and 2% assisted compliance. Evidently, physicians did not perceive the recommended drug as an adequate substitute. Analysis of response time, next, allows an explanation of their way of thinking.



### Response Time to Notifications

As depicted in Table 4, there were statistically significant ( $p < 0.001$ ) differences of ~0.4 seconds on average between responses to notifications which resulted in assisted compliance and in non-compliance for generic substitutes, and of ~2.5 seconds between responses to notifications which resulted in assisted compliance and non-compliance for therapeutic substitutes. Complying with therapeutic substitute notifications took on average 3.2 seconds longer than with generic substitute notifications, and rejecting a notification about a therapeutic substitute took on average about 1.5 seconds longer than about a generic substitute ( $p < 0.0001$ ).

Table 4: Response Time (Sec)						
	Assisted compliance			Non compliance		
	Mean	S.D.	N	Mean	S.D.	N
Generic drugs substitutes	4.455	2.857	816	4.093	2.086	699
Therapeutic substitutes	7.615	5.618	617	5.447	3.026	894

### Relation between the Number of Listed Recommended Substitutes and Compliance

Results also show that for both generic and therapeutic substitutes, but more sharply for the latter, assisted compliance drops with the increase in number of listed recommended substitutes upon notification. This finding suggests perhaps that when faced with a large number of substitutes, physicians tend to retreat back to their original first choice and join the non-compliance group, avoiding the time required to examine lists with many recommended substitutes. The optimal number of substitutes, however, merits further investigation.

### Relation between Physician's Demographic Traits and Compliance with Notifications

Compliance was examined in relation to the following physician's traits: employment type, gender, expertise, age, tenure on the job, work load, and country of education (Israel, Eastern Europe, Western Europe, North America, and South America). There was no significant difference in compliance between genders, and the effect of education origination was also weak and unclear except for the following cases: Non-compliance for generic substitutes is significantly affected by country of education, albeit weakly, yet the source of differences could not be elicited (using Tukey pairwise comparisons). Assisted compliance is significantly affected by country of education for generic substitutes, albeit weakly. Tukey pairwise comparisons showed that physicians educated in Israel exhibited a higher assisted compliance rate than physicians educated in Eastern Europe. The results are summarized in Table 5.

Table 5: Demographic Traits and Compliance (significant relations only)						
Compliance	Generic			Therapeutic		
	Self	Assisted	Non	Self	Assisted	Non
Employment Type	HMO-Employed more (n=350, 4% $p < 0.05$ )			HMO-Employed more (n=297, 3% $p < 0.001$ )		
Expertise	General practitioners (n=576, 5% more, $p < 0.05$ )					Specialists (n=80, 3.8% more, $p < 0.05$ )
Age	Positively correlated	Negatively correlated		Positively correlated		Negatively correlated
Job Duration	Positively correlated					
Work Load	Positively correlated	Negatively correlated			Negatively correlated	Positively correlated
Education Origination		Israel > Eastern Europe			Israel > Eastern Europe	

### Relation between Compliance and Cost Savings

Data on drug costs to the HMO were required in order to analyze actual cost savings during data collection. This, however, could not be obtained from the HMO. Therefore, an estimate has been calculated based on drug costs to the pharmacist, which are apparently different from costs to the HMO. These differences might have distorted the estimates discussed next, for example when a drug was marked as most expensive (\$\$\$\$) yet appeared as the top preferred substitute recommendation on the drug list for reasons known to the HMO. However, this estimation does illustrate that it is possible to measure the financial benefits accrued by the system.

During the study period of forty weeks, 5.27 million prescriptions were documented, of which 1.23 million were for first-time drug prescriptions to which the notification capacity of the system applies. The total estimated cost of the new drugs prescribed was 246.67 Million NIS, of which 67% (165.78 Million NIS) were for chronic drugs, consumed for long time periods, and 33% (80.89 Million NIS) for acute ones, consumed temporarily. Table 6 displays estimated savings in monetary and percentage terms for acute and chronic drugs, keeping in mind savings achieved for the latter have a long-term cumulative impact.

The lower savings on acute drugs may have stemmed from the fact that physicians generally rejected substituting antibiotics, the most commonly prescribed acute drugs, but the associated savings have short-term impact anyway. As evident in Table 6, savings for chronic drugs (4.7%) were higher than for acute ones (2.39%), not only in magnitude but also in terms of long-term impact on organizational drug costs. Altogether, cost savings for both acute and chronic drugs that can be attributed to the notification capacity of the system amounted to 1.6 Million NIS (an average of 3.6% savings).

Table 6: Savings (in Million NIS) on Drugs During the Study						
	Acute drugs			Chronic drugs		
	First choice	Final choice	Difference (%)	First choice	Final choice	Difference (%)
Generic substitutes	15.2	14.8	0.4 (2.39)	14.1	13.6	0.5 (4.72)
Therapeutic substitutes	22.2	22.0	0.2 (1.46)	11.7	11.2	0.5 (4.63)
Total	37.4	36.8	0.6 (1.46)	25.8	24.8	1.0 (4.68)

### Discussion and Conclusions

The spiraling spending on healthcare in general and the growing relative proportion of drug costs in particular, merit special attention to measures taken by healthcare providers and insurers to contain drug costs. Several questions guided this study, the fundamental one being whether it is possible to impact via a clinical information system the drug prescription habits of physicians and to contain costs as a result. In other words, do physicians comply with an HMO's notification to re-think their first-chosen drug and prescribe instead an HMO-preferred substitute when so notified by the system? Other questions stemmed from the primary one are: Is compliance context-dependent and, if yes, what is this context? Does compliance depend on personal or environmental traits and, if yes, how? Is such notification capacity associated with a financial contribution and, if yes, what is it?

### Limitations

The fact that the study took place in an actual work environment, without any sampling, did not allow implementation of a control group. While this might seem like a major limitation of this study, a control group was not required in this case since physicians who exhibit self compliance and prescribe preferred drugs as their first choice never get to use the notification capacity. Only the remaining physicians, who after being prompted by the

notification capacity of the system either exhibit assisted compliance and prescribe substitute drugs or exhibit non-compliance and keep their original first choice, have formed the target group for this study. For members of these two groups, with all other conditions being equal in their natural work environment, it is reasonable to assume that changes in drug prescription toward substitutes are driven by the notification capacity. A major limitation of the studied environment is that it was dynamic during the data collection period, as is the case with any real business environment during a long period of 40 weeks. Hence, changes were introduced both to drugs and to organizational drug formulary, causing some interference, yet allowing observation of learning curves. These were documented and eventually accounted for in the results, actually contributing to a broader understanding of the physicians' behavior (for example by allowing illustration of learning curves). Another limitation lies in the fact that only about half of the drugs included in the HMO's formulary had recommended substitutes, yet these were the most frequently prescribed drugs. The final limitation is related to the inability to accurately calculate cost savings.

### ***Summary of the Results***

The results show that, in general, physicians tended to comply more with notifications about generic drug substitutes instead of patent drugs, than to comply with notifications about therapeutic substitutes. The fact that new drugs and new drug recommendations have been introduced during the study period allowed drawing learning curves, showing that users of the notification capacity of the system learned to comply when convinced that a recommended substitute was an identical drug, demonstrating in these cases a steep learning curve and a high rate of total compliance (self and assisted combined). In contrast, level of compliance when physicians doubted the adequacy of the recommended substitutes remained low throughout. Moreover, users spent longer upon examining therapeutic substitutes, evidently contemplating on the adequacy of the advice. This result attests to the fact that compliance is not automatic but a cognitive and calculated process. It also supports the notion that physicians using the system examined a notification before deciding whether to comply or not, unlike findings of prior research dealing with notification and consent in other contexts, where user tended to hastily agree or not with most notifications (Good et al. 2007). Several demographic traits were found to affect the various compliance types, most notably is the effect of employment type, expertise, age, and work load. Finally, a cautious estimate of cost savings showed that such a system holds promise for significant drug cost containment.

### ***Implications for Research***

While this study highlights several aspects driving and inhibiting compliance to drug substitute notifications generated by a DPS embedded within an EPR system, generalization is not advised before more research is conducted with various types of systems of similar functionality. Several contributions and implications, however, are worth mentioning.

Addressing the primary research question, the results show significant impacts on physician drug prescription habits, comprised of various aspects that merit further elaboration. Evidently, physicians' willingness to comply with the notifications is context-dependent. For example, compliance was significantly different within groups of generic drug substitutes (around 90% total compliance for some pharmacological groups as opposed to 7% for the antibiotic group), as well as between the generic and therapeutic substitute categories (overall compliance close to 90% for the former and about 33% on average for the latter). This finding suggests that physicians' response to notifications is not automatic and thoughtless, but rather a result of a thoughtful cognitive process. This explanation is further supported by the observed response time to notifications, discussed hereafter. Even in cases of extreme resistance, there was still a small 2% shift of the final drug selection, which entails positive financial consequences. Further research to ascertain the results is called for, however, before concluding that intervention with online notifications about generic substitutes is indeed effective in the long term and leads to changes in prescription habits.

While the role of the user interface has long been established as a primary factor affecting user acceptance of an information system (i.e., the effect of perceived ease of use), user interface of a real-time system that impacts the actual workload is even more critical, as is the case with EPR systems in general, and with DPSs in particular. Here every delay counts for both physician and patient, and interference with the flow of work is likely to be considered as impeding perceived usefulness. Indeed, prior research counts decreased productivity as a result of using EPR systems as one of the reasons for slow adoption rates (DesRoches et al. 2008). This conclusion is supported in this study by the correlation between workload and compliance, where more workload is associated with less assisted compliance for both substitute groups. This suggests that physicians are reluctant to invest the extra time required



for examining notifications. Supporting this finding is the positive association between self and non-compliance for generic and therapeutic substitutes respectively, suggesting that physicians revert to their engraved habits under time pressure. Another interesting observation is that when eventually changing their first-choice drug, physicians tended to select the substitute which appears at the top of the HMO-preferred list in 99.5% of the cases for generic substitutes, and 98.5% for therapeutic substitutes. Given the negative relationship between the number of substitutes and compliance, a plausible conclusion worthy of further research is that cutting down the number of substitutes listed to perhaps two or three substitutes may improve the user interface, reduce response time, and increase compliance.

Another issue not covered in this study is the role of the specific user interface deployed by the system, which required a non-compliant prescriber to fill an explanation digital form or comply. More research is required to test the effectiveness of this measure compared to other alternatives, possibly adopted from research in the notification and consent discipline (Good et al. 2007).

From analysis of compliance along the learning curves in the different groups, self compliance emerged as comprised of two phases. Introduction of a change, by either inserting new drugs or altering the HMO's formulary, affected self compliance for about twenty weeks until it finally stabilized. Once stabilized, gradual minor increase in both assisted and self compliance could be observed. In several cases, a change has caused deterioration in self compliance yet assisted compliance either remained high or increased steeply. This finding implies that the notification capacity contributed in both phases, yet differently: in the first phase it contributed to increase in the rate of total compliance and in the second phase it preserved the desirable result of prescribing the substitute drug. Further research is called for, however, to establish the long-term contribution of this capacity.

One of the study's objectives was to elicit differentiating traits of physicians who tend not to comply with notifications about substitutes, allowing the HMO to identify them and address the situation. The findings show that HMO-employed physicians tended to exhibit more self compliance in both substitute groups. Further research should more closely investigate this finding, whether a result of organizational citizenship, organizational culture, educational efforts or other reasons. Similarly, general practitioners tended to self comply with notifications about generic drug substitutes, whereas specialists tended not to comply with notifications about therapeutic substitutes. While this result can easily be explained logically, the true origin of these differences merits further investigation.

In spite of the limitations of the ability to accurately calculate cost savings, the results nonetheless show that savings amounted to at least 4% during the study period of 40 weeks. While calculations of economic returns on investment are tedious in the information systems area in general, the healthcare area no exception, this study does present an example of real-world clinical information system where estimated cost savings have been demonstrated, suggesting that such a system might be a step forward towards drug cost containment. If further substantiated, these results should reduce concerns about return on investment still cited as a primary barrier to EPR or DPS adoption (DesRoches et al. 2008)

## ***Conclusions***

HMOs and other health providers, as well as providers of DPS systems can benefit from the results of this study in several ways. First, the results support the assertion that similar clinical information systems might be effective in reducing drug costs without impeding quality of healthcare. Nonetheless, compliance with DPS notifications is neither automatic nor immediate, and physicians need to be convinced that the notification about substitutes is based on good clinical practices and is not intended to promote cost savings at the expense of patient care quality. Installing a transparent, decent, and professional drug substitute notification capacity in the DPS module of an EPR system, seems to drive drug cost containment goals. Furthermore, time is an important determinant for users when deciding whether or not to comply. Hence, when designing such a system, every feature, key, and functionality needs to be carefully scrutinized for necessity, and its impact on response time must be evaluated.

Our findings relating compliance to employment type and specialty suggest that HMOs might choose to act proactively and differentially toward increasing compliance via educational programs as well incentives, aimed at driving compliance up. In addition, HMOs can revisit and change substitute recommendations that are difficult for physicians to comply with. Workload has also been found to negatively affect compliance in certain instances. Employers should evaluate the benefits of a heavier workload against lost cost savings.

In conclusion, this study illustrates the contribution of a drug prescription system with a built-in substitute notification capacity, in a generally complex and difficult field, where benefits in general, and economic impacts in particular, are not easily obtained and demonstrated. More specifically, six primary conclusions stem from this study: First, the substitute notification capacity can be effective in contributing to changes in drug prescription habits of physicians. Second, compliance with substitute notifications is a cognitive process, characterized by a learning curve, and physicians invest time and thought before deciding whether to comply with or reject notifications about substitutes. Third, the contribution of the substitute notification capacity to compliance is sustained longitudinally. Fourth, the importance of the user interface has been established (specifically the negative effect of displaying a long list of substitute drugs to choose from). Fifth, some substitutes are rejected by the majority of physicians and therefore should be re-examined for either major modifications or elimination altogether. Finally, compliance with substitute notifications can entail significant cost savings, which in this case amounted to at least 4%.

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## Appendix 1: Alerts to the existence of a preferred substitute

**טבלת תרופות**

Commercial Name	Prsnt.	Strength	%	Price
ENALAPRIL	TAB	5MG X 30	15	0
ENALAPRIL	TAB	10MG X 30	15	0
ENALAPRIL	TAB	20MG X 30	15	0
CAPTAPRIL	TAB	12.5MG X90	15	0
TRITACE	TAB	1.25MG X28	15	000
TRITACE	TAB	2.5MG X 28	15	000
TRITACE	TAB	5MG X 28	15	000
TRITACE COMP 2.5M	TAB	28TAB	15	000
TRITACE COMP 5MG	TAB	28TAB	15	000
BENZAEPH				
BENZAEPH				
BENZAEPH				
CIBACEN				
CIBACEN				
CIBACEN				
PERDIX				

**W-CLICKS**

09000  
האם שקלת טיפול ב-ENALAPRIL/CAPTAPRIL.

OK

**Clicks® מערכת לניהול מידע רפואי**

Dr.  
לתרופה אותה הינך רושם קיימת חלופה המועדפת על המומחים במכבי.  
אי לכך נבקשך למלא את הסופס המצורף המיועד להצדקת הרישום של התרופה בה בחרת.  
האם ברצונך לבחור תרופה אחרת?

לא כן

NO YES

## Appendix 2: A digital form to justify drug prescription upon not complying with drug substitute recommendation

**סופס דיווח תרופה לא עדיפה**

**CIBACEN**

הצגנו את התרופה הזו ולא חלופה מועדפת

☐ התרופות חיוניות לגורם הרגיש לאנטיביוטיקה זו בלבד

☐ צפויה אינטראקציה עם תרופות אחרות שברשימה

רשימת תרופות פעילות:

תרופה אחרת:

☐ כשלון טיפולי בעבר של אחת או יותר מהתרופות שברשימה

תרופות עדיפות:

הסיבה לכשלון הטיפול:

☐ כשלון טיפולי בעבר של תרופה אחרת להתוויה זו

שם התרופה:

הסיבה לכשלון הטיפול:

☐ המשך טיפול שהביא לאיזון

☐ סיבה אחרת

בטל אשר

Justification for prescribing this drug and not the preferred substitute

An interaction with another drug is expected

Past failure with one or more drugs in the preferred drugs list

Continuation of a successful treatment

Another reason